

mometer with a pressure of 1 atmosphere at about 20° K. Corrected to the absolute scale the best value would appear to be 4.5° K. The triple point, if it exists, is certainly below 1 cm., perhaps below 7 mm., at which, by corresponding states, the temperature would be about 3° K., and the liquid remains very mobile.

Liquid helium has a density of 0.15, which gives b a value of 0.00017, about twice that which has been assumed before from then known properties and used in calculations. From this, again, the critical pressure must be about 2 to 3 atmospheres, so that helium under 5000 would correspond with carbon dioxide under 100,000 atmospheres. At the boiling point the ratio of vapour to liquid density is 1:11, which indicates a critical temperature of not much more than 5° K., and a critical pressure of about 2.3 atmospheres. Lastly, the value of a will be about 0.00005, the smallest value known, but a most interesting confirmation of van der Waals's contention in 1873, that there must be some attraction between the molecules of all substances.

FRANCIS HYNDMAN.

THE ETIOLOGY OF TRYPANOSOMIASIS.

IN a communication to the Paris Academy of Sciences on February 24, some remarkable discoveries concerning the development of pathogenic trypanosomes in tsetse-flies are brought forward by M. E. Roubaud, member of the Mission Française d'Études de la Maladie du Sommeil. Experimenting with four species of pathogenic trypanosomes, namely, *Trypanosoma gambiense*, *T. dimorphon*, *T. brucei*, and *T. cazalboui*, and with *Glossina palpalis*, Roubaud found that immediately after the fly has fed on the blood of an infected animal, its proboscis contains blood in which the trypanosomes are moving actively. In a very short time, however, the trypanosomes attach themselves to the wall of the proboscis and undergo changes of structure, becoming Herpetomonas-like, with the kinetonucleus in front of the trophonucleus. The undulating membrane has disappeared, and the flagellum, as the organ of fixation, is greatly thickened, so as to resemble a small stalk to the body. These changes are complete in five minutes after ingestion of the blood. The attached parasites at first exhibit active movements of the body, but soon become quiescent; no phenomena of conjugation could be observed, either before or after these changes. But the parasites multiply actively in this situation, forming little tufts or colonies, so that at the end of one hour they have become excessively numerous; they are found attached to the internal face of the labrum, sometimes chiefly at the base of the proboscis, in other cases along its whole length as far as the point. When observed in the salivary fluid they appear immobile, but when treated with serum or with physiological salt-solution they vibrate rapidly and may become free, in which case they swim with the flagellum forward and the hinder part of the body rigid, thus differing greatly in appearance from the original trypanosome-form. The free parasites have a great power of attachment, and when under observation they may fix themselves firmly to the slide.

The author regards this development as a temporary culture or "culture d'attente" of the parasites. Both by observation and experiment he shows that the forms in the proboscis are not derived from trypanosomes regurgitated from the digestive tract of the tsetse. *T. brucei* was found to die out without multiplication in the intestine of *Glossina palpalis* in a short time. The culture in the proboscis was found

to persist beyond forty-eight hours in the case of *T. brucei*, and for five or six days in the case of the other three species of trypanosomes. Only about ten per cent., however, of the tsetses fed on infected animals developed a culture of the trypanosomes in the proboscis. On the other hand, the power of multiplying in the proboscis was found to be a specific relation between the trypanosomes and the tsetse.

These observations lack as yet the crucial test of an experimental infection by means of the proboscis-culture, but nevertheless they throw great light on the problem of the transmission of pathogenic trypanosomes. It has been shown by previous experimenters that the transmission is effected by the direct or mechanical method, and all attempts to prove experimentally an indirect or cyclical mode of transmission have given negative results. That being so, it was difficult to understand why the power of direct transmission should be possessed, apparently, by tsetse-flies alone, and not by other biting insects to an equal degree. Roubaud's observations show that the pathogenic trypanosomes have a quite specific power of adapting themselves to the salivary secretions of the tsetse, and thus explain the peculiar relation between these flies and the spread of diseases caused by trypanosomes in Africa. Moreover, a very important new line of investigation is indicated by the author's discoveries.

E. A. M.

NOTES.

ABOUT a year ago Sir William Ramsay and Mr. A. T. Cameron announced that they had observed the production of the alkaline metals and lithium in solutions of copper salts submitted to the action of the radium emanation, and concluded that in the presence of the emanation copper underwent a degradation into the elements potassium, sodium, and lithium. In the current number of the *Comptes rendus* of the Paris Academy of Sciences, Mmc. Curie and Mlle. Gleditsch give an account of the attempts they have made to repeat this experiment. They first point out the extreme difficulty of obtaining chemical products free from lithium. This metal was found in distilled water and in nearly all the reagents. If a reagent, free from lithium, is allowed to stand in a glass vessel, traces of this metal are found after some time. Even fused quartz is not a safe material, since both opaque and transparent quartz were found to contain notable amounts, the latter furnishing the larger proportion. The experiments had therefore to be carried out in such a manner that the solutions came in contact with platinum only; the water and the acids necessary for the experiment were re-distilled from platinum and preserved in platinum bottles, and after this treatment no lithium could be detected in the residue from 25 c.c. of the nitric acid, 25 c.c. of hydrofluoric acid, and 250 c.c. of water. The quantities of copper and radium emanation were about the same as those used in the original experiment. The salt residues obtained weighed 0.4 and 0.5 milligram, the control experiments giving 0.3 and 0.2 milligram. Spectroscopic examination of this residue showed it to consist of salts of sodium with a little potassium; the presence of lithium could not be proved. Direct experiments on known mixtures of sodium and lithium sulphates showed that the amount of lithium present in the residue, if any, must be less than 0.6×10^{-5} milligrams. In conclusion, the authors state that they have been unable to confirm the experiments of Messrs. Ramsay and Cameron. It is impossible to state that no trace of sodium or lithium is formed in this experiment, but they consider that the fact of the formation of these elements cannot be considered as established.

FOR the second time during the present summer a drought has occurred over England, and the present occurrence is of considerable duration. At Portland Bill absolutely no rain fell from July 17 until Tuesday, August 18—a period of thirty-two days—and at Jersey the aggregate measurement of rain for the period was only 0.07 inch. In London the total measurement of rain for thirty-one days is 0.22 inch, which fell on three days. Rain has fallen rather more frequently in Scotland and Ireland, but in these parts of the kingdom the shortage of rain is considerable. At Leith the measurement for twenty-four days is 0.11 inch, whilst at Roches Point it is only 0.08 inch for twenty-three days, and even at Valencia the aggregate measurement of rain this month is 0.11 inch. The Weather Summary issued by the Meteorological Office shows a considerable deficiency of rain for the present summer. In the extreme south of England, the English Channel stations show a deficiency of 3.26 inches, whilst for the south-west district of England the deficiency is 3.07 inches, and in the south of Ireland 3.01 inches. In most districts the aggregate rainfall since the commencement of the year is less than the average, the deficiency amounting to 5.7 inches in the English Channel, and exceeding 4 inches in the south-west of England and in the south of Ireland.

THE International Historical Congress has accepted the invitation of the British Academy to meet in London in 1913.

DR. H. MORIZE has been appointed director of l'Observatoire de Rio de Janeiro in succession to the late Prof. L. Cruls.

REFERRING to the subject of the standardisation of time, a correspondent points out that in Antwerp there is a system by which, at various prominent points of the city, clocks are shown "connected electrically with the observatory."

SOME interesting experiments on coal-dust explosions have been started, under the direction of Mr. W. E. Garforth, at the Altofts Colliery, Yorkshire. An experimental explosion was witnessed on August 14 by Mr. E. Reumaux (Lens), Dr. J. A. Holmes (United States Geological Survey), Captain Desborough, H.M. Inspector of Explosives, and a number of experts from France and the United States. The cost of the experiments is borne from a special fund of 10,000*l.* contributed by colliery proprietors.

WE regret to see the announcement that Prof. F. Paulsen, professor of moral philosophy in the University of Berlin, died on August 14, at sixty-two years of age. Prof. Paulsen was the author of several important volumes on philosophy and ethics, and he wrote extensively on educational subjects, among these works being "Die deutschen Universitäten," "Geschichte des gelehrten Unterrichts auf den deutschen Schulen und Universitäten," and a volume on past and present German education, of which a translation into English has been published recently.

WE regret to see the announcement of the death, at the age of sixty-two, of Prof. Alfred Giard, professor of general biology at the Sorbonne, Paris, and member of the Paris Academy of Sciences. He was a student at the Superior Norman College in 1867, and became a Doctor of Science in 1872. In the following year he became professor of natural history at the Industrial Institute of the North of France, in 1880 professor of zoology in the University of Lille, founder of the marine biological laboratory at

Wimereux in 1884, and professor at the Sorbonne in 1887. His researches and lectures on general embryology and the evolution of living forms gave him a high position among biologists. Prof. Giard was elected vice-president of the Société de Biologie in 1896, and president of the Société entomologique in the same year. In 1900 he became a member of the Paris Academy of Sciences in succession to Prof. Milne-Edwards.

DR. CHARLES TAYLOR, the master of St. John's College, Cambridge, who died suddenly at Nuremberg last week, was a man of varied and sound learning, which has secured for him a permanent place in mathematical as well as in theological literature. His larger book on geometrical conics is remarkable for its elegance, its well-arranged historical notes and prolegomena, and its treasury of examples. The smaller treatise does not suit every kind of student, especially for examination purposes, but it has enjoyed considerable popularity, and is, in many respects, one of the most attractive and enjoyable works on the subject. While thoroughly at home in the methods of the ancients, Dr. Taylor never fully absorbed the projective theory of the moderns; for example, his notes on the circular points at infinity are merely ingenious trifles, and obscure, rather than elucidate, the geometrical meaning of these ideal elements. Apart from this, he rendered a real service to mathematics by devoting so much time to a limited subject with which he was specially competent to deal, and his *magnum opus* in this field is not likely to be superseded.

THE measures devised by Sir Henry Hesketh Bell, Governor and Commander-in-Chief of Uganda, for combating the spread of sleeping sickness are, according to Reuter's Agency, meeting with a considerable measure of success. During 1907 there were no new cases among Europeans, and the deaths among natives during the twelve months numbered less than 4000. The whole of the population has been removed from the shores of the Victoria Nyanza, and it is hoped that the disease-carrying fly in that belt, if not re-infected, will gradually cease to be a source of danger. Several thousands of the sufferers from sleeping sickness are being maintained in segregation camps, but the treatment by atoxyl is not proving of much avail. Consistent and vigorous action will be necessary for some years to come if sleeping sickness is to be stamped out of the country.

WE learn from the *British Medical Journal* that, on October 15, the University of Bern will initiate a great festival in celebration of the two hundredth anniversary of the birth of the great physiologist, botanist, and poet, Albrecht von Haller. Prof. Steck will deliver an address on the personal characteristics of Haller, Prof. Kronecker will discourse of Haller's Bernese home and of his method of working, and Prof. Fischer will treat of Haller's relations with the scientific men of his time, and especially of his relations with Linnæus. On October 16 a monument to Haller's memory will be unveiled on the ground facing the new university buildings. Haller was elected a Fellow of the Royal Society of London on October 25, 1739, when he was only thirty-one years of age; and Prof. Arthur Gamgee, F.R.S., will present, in the name of the society, a Latin address to the University of Bern.

REPORTS as to progress of experiments in wireless telephony appeared in the daily papers during the past few days. The Paris correspondent of the *Times* states that experiments made at the Champ de Mars have established communication with Mont Valérien at a distance of 8 kilo-

metres, Villeneuve St. Georges at 20 kilometres, and Méhun at 50 kilometres. The *Daily Chronicle* correspondent at Milan states that Prof. Majorana is engaged in installing his system of wireless telephony between Rome and Sardinia, after a successful series of experiments between Montemario, the military fortress in Rome, and the Porto d'Anzio Lighthouse, during which communications were distinctly heard over the intervening distance of thirty-six miles. The Central News Agency reports that three French naval officers have succeeded in constructing an apparatus by which they claim to be able to hear singing and speaking distinctly between Paris and Dieppe, a distance of 100 miles. This is announced as a remarkable achievement, but we learn from the *Electrician* that effective wireless telephonic communication was established some time ago between Syngby, near Copenhagen, and Weissensee, near Berlin, a distance of 260 miles.

In the *Times* of August 15 Dr. R. Munro records the discovery of a second lake-village in the neighbourhood of Glastonbury, where excavations have been in progress since 1892 under the supervision of Mr. A. Bulleid. The village recently discovered is situated at Meare, about two miles north-west of Glastonbury. It is clear that the area occupied by these villages was originally a sheet of water, the overflow from which found its way into the Bristol Channel fourteen miles distant. The objects hitherto discovered at Meare consist of long-handled weaving combs, clay sling-bullets, and a few articles of bronze, including a curious finger-ring, with bones and teeth of domestic animals. The manufactured specimens belong to what has been termed the "late Celtic" period, of which sporadic "finds" have occurred in various parts of the country; but Glastonbury is the first inhabited site which has furnished evidence of the entire social life of a late Celtic community. Dr. Munro appeals for funds and the assistance of archaeologists in the excavation of this interesting site.

PROF. MILNE reports to the *Daily Mail* the occurrence of a seismic storm at the end of last week. On August 13 he recorded three earthquakes at Shide; and on August 14 there was a fourth, which commenced at 1.8 a.m. and attained its maximum twenty-six minutes later. The records indicated that the origin of the disturbance was at a distance of 3800 miles. A message from Prof. Michie Smith to the *Daily Mail* states that at the Kodaikanal Observatory on August 17 an earthquake was recorded commencing at 11.3 a.m. (Greenwich Time). The long waves began at 11.35 a.m., and the maximum was reached at 11.38. At 6 a.m. on August 18 a violent earthquake occurred at Terni, in the province of Perugia. Very strong shocks were also felt at Messina, in Sicily, and the surrounding country. It is also reported that fissures half a mile in length were caused by an earthquake which occurred at the town of Eureka, California, on the morning of August 18.

THE French expedition to Antarctic regions, under the command of Dr. François Charcot, left Havre on August 15 in the *Pourquoi Pas*. The French Parliament made a grant of 32,000*l.* for the expedition, and the Prince of Monaco, the Paris Geographical Society, and other scientific bodies have assisted in its organisation and equipment. From the Paris correspondent of the *Times* we learn that Dr. Charcot expects to be absent about two years. One of his objects in returning to the regions of the South Pole is to bring back specimens of the fossils to which Dr. Nordenskjöld has already directed attention. He intends to transport them to one of the open ports of

the Antarctic continent, either Port Lockroy or Port Charcot, and then to go on to Loubet Land to begin his exploration of the regions to the south. He has taken with him provisions for twenty persons for more than two years. The *Pourquoi Pas* is expected to arrive face to face with the southern ice about December 15, at about 800 kilometres south of Cape Horn. Dr. Charcot's staff includes M. Bougrain, who will make the astronomical observations; M. Rouch, specialist in meteorology and oceanography; M. Godefroy, who will study the hydrography of the coast and the tides; M. Gourdon, geologist; and Dr. Jacques Liouville, marine zoologist and botanist. Six automobile sleds will, it is hoped, enable the expedition to make its way well into the interior along the glaciers, and supplement the services rendered by the skis. The *Pourquoi Pas* is 41 metres long, 9.20 broad, and has a tonnage of 800.

THE surviving members of the Denmark Greenland Expedition arrived at Bergen on August 15, and Lieut. Trolle, master of the *Denmark*, the vessel of the expedition, has given further particulars of the lamentable death of the leader and his two companions. It appears from a Reuter message that a harbour for the ship was found in latitude $76\frac{3}{4}^{\circ}$. Mr. Erichsen, Lieut. Hagen, and Mr. Brönlund perished in November, 1907, in an attempt to return from the north coast of Greenland over the inland ice, having been obliged to remain on the north coast through the summer, owing to the state of the weather. A sledge expedition was organised in the spring of 1907, under the command of Mylius Erichsen, to explore the unknown part of the north-east coast of Greenland. The expedition consisted of ten sledges in four batches. Three of these returned before the beginning of summer, and in September, 1907, an expedition was sent out to find the fourth party, which had not returned. At 80° the expedition found open sea close to the coast. In the course of the autumn numerous sledge expeditions started, and in March, 1908, a fresh rescue party set out, which brought back definite news of the fate of the missing sledge party. During the spring several other sledge journeys were made on the inland ice towards the south, as far as Ardencaple. The coast of Greenland was explored as far as Cape Bridgman, $83\frac{3}{4}^{\circ}$, and into Peary Channel to Cape Glacier. The coast line took a much more easterly direction than was expected, and connection was made with Peary's landmark on Peary Land. At Cape Glacier the Danish flag was hoisted, and the country taken possession of for Denmark, and called King Frederic VIII. Land. No living people were encountered. Scientific expeditions were continuously made into the district surrounding Port Denmark, and also from the ship. On the road large collections were made, and a mass of scientific material was collected; numerous sketches, paintings, and photographs of the country were also made.

A LITTLE pamphlet entitled "Die neuere Tierpsychologie," by Dr. Otto Zur Strassen, has been received from Mr. B. G. Teubner, of Leipzig and Berlin. The essay, though general in form, contains numerous references to experimental results. The author cannot, however, be considered to have proved the conclusion which he eventually reaches, viz. that a physicochemical explanation of animal behaviour is possible and sufficient from the protozoa to the primates.

IN a paper on the variations and genetic relationships of the American garter-snakes, forming Bulletin No. 61 of the U.S. National Museum, Mr. A. C. Ruthven ex-

presses the opinion that the work of systematic naturalists should be more specially directed towards throwing further light on the problems involved in the origin of species. The barrenness of general results in this direction, particularly in work on reptiles, cannot be entirely attributed to lack of facts, but, in some degree at any rate, is due to the methods employed. Garter-snakes follow the usual laws of geographical distribution, closely related forms on the same line of descent generally inhabiting adjacent regions. Originating apparently in northern Mexico, the garter-snakes became there differentiated into four main groups, which subsequently radiated in all directions, but principally to the northward. Wherever they entered different regions, the different environmental conditions acted unfavourably, retarding growth, and differentiating the group into dwarfed forms.

In a paper on the ancestry of the tailed amphibians, published in the June number of the *American Naturalist*, Dr. R. L. Movelic comes to the conclusion that the labyrinthodonts or stegocephalians should be split up into two distinct groups, namely, the Branchiosauria of the Carboniferous and Permian, on the one hand, and a second group, embracing the Microsauria, Aistopoda, and the more typical labyrinthodonts, on the other. The first group is regarded by the author as representing the ancestral stock of the modern tailed amphibians, whereas the second is closely related to reptiles, and should not improbably, indeed, be included in that class. From the Microsauria, in which the ribs are long and curved, the Branchiosauria, as typified by the minute Protriton (*Brachiosaurus*) of the European Permian, are distinguished by their short ribs, which articulate with the transverse processes of the vertebræ. The Branchiosauria agree, in fact, with the modern *Amphibia Caudata* in their short, straight ribs, the stout transverse processes arising from the bodies of the vertebræ, practically in the number of the presacral vertebræ, as well as in the structure of the skull and pectoral and pelvic girdles, in the number of the toes (four in front and five behind) and of their component segments, as well as in the structure of the long bones, the shape of the body, and the existence of a lateral-line-system. In skull-characters, as well as in the shoulder-girdle, the modern tailed amphibians exhibit marked signs of degeneration, and they may accordingly be regarded as degenerate derivatives of the Branchiosauria. Similarly, the Aistopoda are provisionally regarded by the author as a degenerate branch of the Microsauria.

THE Uganda Protectorate comprises numerous districts, such as Busoga, Bukedi, Unyoro, Toro, Ankole, &c., and the kingdom of Uganda. In the "Official Gazette of the Uganda Protectorate," vol. i., No. 6 (June 15), the following notice appears:—"The Secretary of State for the Colonies has approved of the use officially of the name Buganda for the Kingdom of Buganda, as distinct from the word Uganda, which is still to be used as designating the whole of the territory included within the Protectorate." As an example of the great strides that civilisation is making in Central Africa, it may be noted that in the same "Gazette" tariffs are quoted for motor-waggon and motor-car fares between Entebbe and Kampala.

A GREAT deal has been written about the antiquity of the use of iron in China. Commandant Bonifacy (*Bull. Soc. d'Anth.*, Paris, 1907, p. 512), from a study of the languages of numerous tribes in south China, finds that since a long period of time the metals have borne sometimes a Chinese name and sometimes a particular name which varies according to the tribe, from which he

naturally concludes that certain of these metals were introduced by the Chinese, whereas others were known to the tribe before its contact with Chinese civilisation; iron belongs to the latter group, and copper and bronze to the former. Hence the tribes of south China and of Indo-China knew iron before copper. They employed worked flint in China 2200 years B.C., when iron was already known. China has not passed through an age of bronze or copper.

In the *Essex Times* of August 8, the Rev. J. W. Hayes, of West Thurrock Vicarage, Grays, has directed attention to some old underground workings for chalk at Hemel Hempstead, which in his opinion throw much light on the origin and use of dene-holes generally. It appears that in order to obtain chalk suitable for lime-making it was until recently the practice in parts of Hertfordshire to work the chalk in subterranean chambers reached by deep shafts. One pit, dug as lately as 1882, attained a depth of 90 feet. A vertical shaft, of circular section, about 5 feet in diameter, was sunk through superficial deposits until the hard chalk was reached, and from the bottom of the shaft three so-called "arches" were struck out. These arches were chambers, which in some cases were more than 12 feet high. The chalk was mined in these drifts for a length of twenty to twenty-five yards, and when the distance of the working face from the bottom of the shaft became inconveniently great, or when the roof proved unsound, a new pit would be sunk. The centre of the industry was the parish of Hemel Hempstead, but many abandoned pits are to be found in the country between Tring on the west and Shenley, near Barnet, in the south.

We have received copies of a new publication, *Neue Weltanschauung*, published in Stuttgart under the editorship of Dr. W. Breitenbach, with the object of diffusing the results of modern scientific research in its application to philosophy and culture. The editor contributes an article on modern theories in connection with heredity and their scientific foundation, in which he discusses the "pangeneses" theory of Darwin, de Vries's theory of "pangenes," and Haeckel's conception of "plastidules." An appreciation of Charles Darwin, and a photographic reproduction after Collier's drawing, have been evoked by the Darwin jubilee.

A LIST of rare shrubs for growing in the open garden, compiled by the Hon. Vicary Gibbs, is published in the Journal of the Royal Horticultural Society (vol. xxxii., part ii.). The author prefaces the article with the intimation that his remarks refer to plants grown in Hertfordshire on a cold, clay soil where severe frosts are experienced in late spring. *Rosa ferruginea* among the roses, *Colletia cruciata*, *Cotoneaster acutifolia*, and *Sambucus canadensis* are some of the plants receiving special commendation; several species are selected under the genera *Berberis*, *Spiræa*, *Ribes*, *Syringa*, and *Ilex*. The author also mentions the tree pæonies, varieties of *Paeonia Moutan*, that he has imported directly from Japan. In the same number of the journal Mr. J. Hudson discusses the subject of plants for terrace gardening. He supplies useful notes on the methods of training scented geraniums, and recommends the species *radula major*, "Clorinda," and *capitatum*. *Aloysia citriodora* is another choice, and some bamboos, palms, and species of *Phormium* are suggested.

THE Philippine Weather Bureau has just issued part ii. of the annual report for 1905. Besides the Central Observatory at Manila, the Bureau controls forty-four

secondary stations, seven being of the first order. The report contains the daily meteorological observations made at all these stations during 1905. At the first- and second-order stations the observations are made six times a day; at the third- and fourth-order stations twice a day. The data are collected into monthly batches, but although the monthly means are there, they are not brought together so as to form annual summaries for the various stations.

IN a letter we have received from Mr. H. H. Scott, meteorological observer for Launceston, Tasmania, some interesting observations on the sinking of stones are recorded. In the course of the day Mr. Scott twice traverses in full daylight a piece of public land between two thermometer screens. Much of the surface of this land is charged with brick dust, and on it fragments of diabase have been scattered. In the absence of frost the path between the screen remains firm and compact. During June last twenty-one of the first twenty-nine days commenced with frost, and outside thermometers read as low as $19^{\circ}3$ F. Later in the day bright sunshine followed, and the reading of the solar thermometer sometimes reached 101° F. Consequently, the ground was first frozen, then soaked with moisture, and afterwards warmed considerably. Mr. Scott noticed that day by day the earth round the fragments of diabase appeared to be lifting slowly. On June 29 he found some fragments to be 18 mm. to 20 mm. below the surrounding surface, and in the case of unusually large pieces of rock even deeper. No earthworms were at work in the neighbourhood of the stones, and the alteration in level appeared to be due wholly to atmospheric agency.

IN the "Album der Natuur" Dr. J. G. van Deventer writes on the Warner Powrie method of colour photography, and refers to an article in NATURE, October 24, 1907 (vol. lxxvi., p. 642). In this method, coloured lines replace the coloured dots of the Lumière process, about 320 lines being the average to the centimetre. The advantages are that the colour screen is more regular with alternating colour-bands, and that positive prints can be made on paper. The colour screen is prepared from bichromatised gelatin by exposure under a screen of bands divided by spaces half their width. The resulting ridges of gelatin are stained with appropriate dyes, and then present a series of coloured bands of which the relative thicknesses are as 1, 2, and 3 for the colours violet, green, and orange, the absolute thickness varying from 5 to 40 microns. Sensitive emulsion is then deposited over this screen, and a transparent positive obtained as with the Lumière method. To obtain further positives, use is made of the already known Uto paper. In this the sensitive layer is mixed with three organic dyes complementary to those in the screen, and mixed with anethol. This gives the property that the absorption of a colour causes the same coloured dye to become colourless. In this way a positive coloured print is obtained. Dr. Deventer does not think that ordinary Uto paper containing silver can be used. He shows how Powrie uses two mirrors at an angle of 110° with a thin glass plate between the positive plate and the paper, obtaining the combination empirically which results in giving the best intensification and elimination of any dark bands. The paper ends with a description of the method of obtaining the *clichés* for three-colour printing.

WE have received new catalogues of electrical and other apparatus from Messrs. Siemens Bros. and Co. and from the Cambridge Scientific Instrument Co. which should prove useful to those who are considering the purchase of apparatus for the coming winter. The latter catalogue is

in the form of a file, with an arrangement at the end to enable sheets issued in the future to be readily attached. It also gives more information about the sensitiveness of the various instruments described than we have seen previously in any instrument maker's catalogue.

THE attempts which have been made in the past to substitute some instrument for the eye in accurate photometry have not been very successful owing to the methods adopted not having proved so sensitive as the eye. M. Charles Féry appears to have overcome this difficulty by an arrangement he described to the Société française de Physique in May, which is given in the August number of the *Journal de Physique*. The light to be tested is placed a metre away from a lens, which forms an image of the source on the receiving disc of a Boys radiomicro-meter. Between the lens and disc the light passes through a layer of water 4 cm. thick, containing copper acetate of such strength that there is 1 gram of copper in a litre of solution. This solution, the author finds, cuts out of the beam those radiations which do not affect the eye, and the instrument gives results for different sources which are in close agreement with those given by the Lummer-Brodhun photometer. It also enables the optical efficiency of the source, *i.e.* the ratio of the luminous to the total radiation, to be readily found.

PROF. J. C. McLENNAN, University of Toronto, described in NATURE of May 14 (p. 29) some experiments which led him to conclude that the radio-activity of potassium and its salts is not connected with a *normal* atomic property of the metal. The salts used were those ordinarily sold by the best makers as chemically pure, and in arriving at the conclusion mentioned it was assumed that the salts used possessed, at least approximately, the high degree of purity claimed for them. Prof. McLennan now writes to say that analysis has proved this assumption to be incorrect. A comparison of the percentage by weight of potassium in several salts with the radio-activities of the salts has shown that the salts which contained the most potassium were those which exhibited the strongest activity, and that for the more active ones the radio-activity was almost directly proportional to the amount of potassium present.

MESSRS. CROSBY LOCKWOOD AND SON send us the first number of a quarterly circular of engineering and technical literature (classified under subjects) just published by them. The circular contains particulars of the most important works in engineering, science, and technology published during the past three months in England and in America, and as it will be repeated every quarter it should prove of assistance to engineers.

THE nineteenth annual general meeting of the Institution of Mining Engineers will be held at Edinburgh on September 2-4. The following papers will be read, or taken as read:—coal-dust to date and its treatment with calcium chloride, H. Hall; on the practical use and value of colliery rescue-apparatus, G. Blake Walker; the Wemyss coal-field, J. Gemmell; the working of oil-shale at Pumpherston, W. Caldwell; deep diamond boring, J. Thomson.

IN the Bulletin of the Johns Hopkins Hospital for July (xix., No. 208), Prof. Howard Kelly, in an article entitled "The Barred Rod to Anatomy," gives an interesting account of the "body snatchers," Burke and others, and of the times in which they lived, from the point of view of the study of anatomy.

MESSRS. BURROUGHS, WELLCOME AND Co. have issued an interesting and well-produced guide, with descriptive catalogue, of their exhibits at the Franco-British Exhibition; also pamphlets describing their laboratories, and the research work that has been carried out in them.

THE *Philippine Journal of Science* for April (iii., No. 2) contains a number of important papers relating to medical science—on cholera, on typhus fever, on the virus of cattle plague, and on the venom of the “habu,” a venomous snake found in some of the Japanese Islands.

IN No. 33 of the Scientific Memoirs of the Government of India Colonel Bannerman discusses the production of alkali in broth culture media by the plague bacillus, which may reach an amount equivalent to 1.5 per cent. to 2.5 per cent. of normal sodium hydroxide.

OUR ASTRONOMICAL COLUMN.

ANOTHER LARGE SUN-SPOT GROUP.—The renewal of the sun-spot activity illustrated in these columns last week is being well maintained. On Wednesday, August 12, the large groups shown on our photograph had reached the western limb of the sun's disc, and on Thursday bad weather prevented observations entirely at South Kensington; but on Friday morning it was seen that a large scattered group of small spots had broken out near the centre of the disc, whilst numerous small spots were scattered over the surface. This new group was visible to the naked eye, and has apparently evolved from a prominent group of faculae which was observed near the eastern limb earlier in the week.

THE TOTAL SOLAR ECLIPSE OF DECEMBER 22–23.—Further particulars concerning the possibility of observing the total eclipse of the sun in the Antarctic, in December next, are contained in a letter we have received from Prof. Wilhelm Krebs.

Prof. Krebs points out that both Bouvet Island and the more northerly Thompson Island lie outside the real ice limits, and that only small, isolated icebergs were observed by the expedition ships that have recorded them. Thus, with a totality lasting, according to his calculations, 11.3 seconds, it might be possible to secure pictures of the corona at Bouvet, or Thompson, Island in December. Meteorological and magnetic observations could be carried out, as also could observations of the shadow bands and of the radiation variations. The approximate times of mid-eclipse in different longitudes are shown below:—

Longitude	...	W. 60°	40°	20°	0°	20°	40°	60° E.
G.M.T. Dec. 22–23...		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
		22 15	22 37	23 11	23 45	0 15	0 43	1 6

ONE HUNDRED NEW DOUBLE STARS.—Prof. R. G. Aitken's twelfth list of double stars is published in No. 134 of the Lick Observatory Bulletins, and brings the total number now discovered up to 1800. All the double stars in this list were discovered and measured with the 36-inch refractor, and attention is directed to Nos. 1745, 1746, and 1777, which add closer companions to O Σ 190, Σ 1224, and Σ 1579 respectively.

THE NIGHT-GLOWS AT THE BEGINNING OF JULY.—In No. 4266 of the *Astronomische Nachrichten* (p. 297, August 1) Prof. Max Wolf discusses the night-glows which attracted so much attention about July 1. On that date Prof. Wolf was unable to carry out his usual programme of photography because the sky-glare was far too bright, and in the north only such stars as Capella and α and β Ursæ Majoris were easily visible to the naked eye. At first Prof. Wolf suspected that a display of aurora was taking place, but failure to observe the aurora spectrum or any fluctuations of the light led him to conclude that the phenomenon was due to the peculiar high cirrus cloud that prevailed.

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THE EMPLOYMENT OF SELENIUM CELLS IN PHOTOMETRY.—Readers of these columns will remember that some time ago Messrs. Stebbins and Brown, of the Illinois University Observatory, made photometric observations of the moon's light, using selenium cells (see NATURE, January 16 and 30, pp. 258 and 302), and subsequently showed that the great differences found were due to the different colour-sensibilities of these cells (NATURE, May 7, p. 18). Referring to these observations in No. 1, vol. xxviii., of the *Astrophysical Journal* (p. 83, July), Prof. Pfund points out that the curves determined by Mr. Stebbins are not true sensibility curves, because the energy curve of the spectrum employed was not taken into account. He also suggests that, at the present time, the use of selenium cells is unwarranted except in observations of the variations of a light source of which the effective area alone changes. A method of employing selenium cells in combination with colour screens for the determination of stellar magnitudes has been devised by Prof. Pfund, and will be fully discussed in a future publication.

ECLIPSES OF SATURN'S SATELLITES.—During the coming opposition of Saturn, Rhea and the inner satellites will be eclipsed. The following times of eclipse are taken from a paper published by Dr. H. Struve in No. 120 of the Publications of the Astronomical Society of the Pacific:—

	h. m.	Disappearance	h. m.	Reappearance
August 22 ...	13 6 ...	4'3 ... 218	14 15 ...	2'1 ... 193
„ 31 ...	14 11 ...	3'0 ... 211	14 59 ...	1'8 ... 193

The distances are measured from the planet's limb, and the position-angle from the N. point of the minor axis towards E. (the *Observatory*, No. 399, p. 326, August).

A LARGE PROMINENCE.—In No. 1, vol. xxviii., of the *Astrophysical Journal* (July, p. 79), Mr. Evershed describes a large prominence of which a series of photographs was obtained with the Kodaikanal spectroheliograph on February 18. The first plate was secured at 8h. 23m. (Indian Standard Time), and showed no unusual disturbance, but a supplementary photograph at 9h. 38m. showed that a prominence faintly showing on the first plate had developed enormously, the disturbed area extending from position-angle 80° to 127°. Visual observations showed prominence matter on H α , and the sodium and magnesium lines were also observed bright within the affected region. Twenty “limb” spectroheliograms were obtained during the day, the last being taken at 18h. 2m., when the sun was less than 3° above the horizon, and, of these, fourteen are reproduced. These show that the increase in size took place quite gradually, and that the velocity with which the great mass left the sun was, after the first outburst, consistently accelerating. The main mass of matter was joined to the sun by a fine filament, situated at the edge of the disturbed area, which appeared to act as a flexible cord holding one end of the mass to the sun and forcing it to swing out in a curve. The greatest height shown on the photographs was 585 seconds of arc, or more than 260,000 miles.

THE WATER OF THE METROPOLIS.

THE report of the Water Examination Committee (July 18, 1908), and the first report on research work by Dr. Houston, the director of water examinations, Metropolitan Water Board, contain matter of considerable interest. The first details the results of the chemical and bacteriological examinations, many hundred in number, of the raw water and of the filtered supplies delivered to the consumers within the area of the Water Board for the year ending March 31, 1908. The matter is arranged in tabular form, and, *inter alia*, much information is given respecting the distribution and types of *Bacillus coli*, the effects of subsidence and filtration on the bacterial content of the water, and the composition of the media employed in bacteriological research in the Board's laboratories.

Dr. Houston's report deals with the important question of the vitality of the typhoid bacillus in artificially infected samples of raw Thames, Lee, and New River water, with